Kidde Aerospace

FENWAL Safety Systems

Hydrostatic Test and Marking of Aircraft Fire Extinguisher

• What is a Hydrostatic Test?

As defined by the Compressed Gas Association, Inc. a hydrostatic test consists of enclosing a cylinder filled with water into a test jacket also filled with water. Internal pressure is then applied into the cylinder, causing the cylinder to expand. This total and permanent expansion of the cylinder is determined by measuring the amount of water displaced by the expansion of the cylinder when under pressure and after the pressure is released. Hydrostatic testing of cylinders used for transportation and storage of compressed gas is specified by the U.S. Department of Transportation in Code of Federal Regulations, Title 49, and by Transport Canada in CSA B339. The hydrostatic test is required for newly manufactured cylinders, as well as for re-qualification of existing cylinders.

There are three types of hydrostatic test methods. The Water Jacket method is the most common method used and is the procedure required when volumetric expansion determinations are required. This is the only method that will qualify a cylinder for charging to 10% in excess of the marked service pressure. The Direct Expansion method consists of forcing a measurable volume of water into a cylinder filled with a known weight of water at a known temperature, and measuring the volume of water expelled from the cylinder when the pressure is released. This method has practical limitations in its use. The third method is the Proof Pressure test, also known as the modified hydrostatic test, and it consists of examining a cylinder under pressure for leaks, bulges, and any visible defects. The method used by Kidde Aerospace is the Water Jacket method.

• When is the Hydro test required?

In accordance with the D.O.T., Tittle 49CFR, any cylinder used for the transportation of hazardous materials regardless of the mode of transportation must be an authorized package. To qualify as an authorized package each cylinder must conform to an initial qualification and re-qualification at a specified period of time. The re-qualification intervals are specified by the D.O.T. based on a minimum test pressure that the cylinder is designed to handle. These specifications are identified on the containers as an alphanumeric code that designates a specific test period. Kidde Aerospace fire extinguisher containers are classified as 4D, 4DS, and 4DA, and would normally require 2 times of service at a 5-year test interval. However, the FAA based on the lack of regulatory guidance for containers used as part of aircraft equipment has introduced recent changes. These regulatory changes are identified in the FAA Bulletin HBAW 02-01, and grants approval to aircraft owner/operators to follow Kidde's recommendations for the cylinder life limits and retest intervals. Kidde Aerospace recommends a test interval of 10 years for stainless steel containers, 5 years for hermetically sealed titanium containers, and 5 years for non-hermetically sealed containers.

K.A. fire suppression system cylinders manufactured for aircraft that are hermetically sealed are fusion welded. These extinguishers use welds at all component interfaces and joints. The containers have an acceptable leak rate of no greater than 1 x 10 -7 cc/sec, and are used on the majority of today's transport aircraft. The non-hermetically sealed containers are not fusion-welded. These extinguishers use copper discs, gaskets, o-rings, crush washers, etc. for sealing interfaces and/or joints. The non-hermetic containers have an acceptable leak rate of no greater than 1x10 -5 cc/sec and are commonly used on older aircraft. A container being hermetically or non-hermetically sealed determines the Hydrostatic Test Intervals.

The manufacturer or testing facility bearing a Re-qualification Identification Number, or RIN would normally accomplish the initial qualification of the cylinder. This number code is assigned strictly by the D.O.T. to uniquely identify a cylinder qualification, re-qualification, repair, or rebuilding facility, and can only be used by approved persons. This initial testing must be done prior of releasing the container for commercial transportation. The RIN, test classification, and hydro test dates must be clearly identified on the container, on specified locations.

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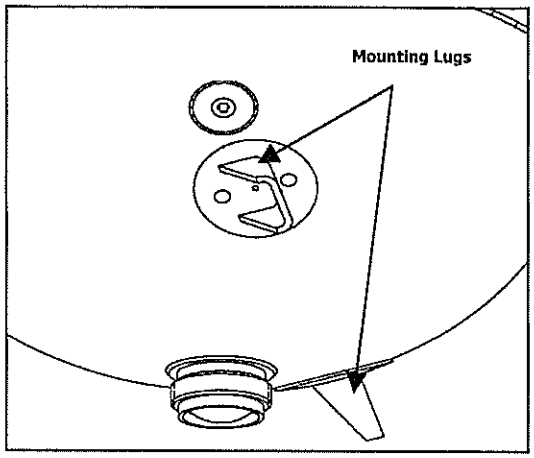
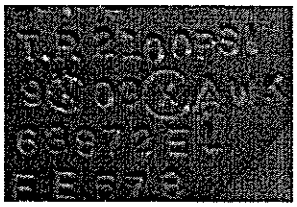
- **How are containers marked?**

49 CFR, Part 183.213 of the Department of Transportation requires that cylinders must be plainly and permanently marked on the metal of the cylinder. Unless authorized by the cylinder specification, marking on the cylinder sidewall is prohibited and must be metal stamped on the upper end of the cylinder. Therefore, in the case of the cylindrical shaped aircraft fixed fire extinguishers, Kidde Aerospace marks the cylinders on the mounting lugs.



Typical Container

Month (K) **Year** (X) △ **WK**



Month: Describes the exact month the hydrostatic test was performed. It does not specifically nor necessarily reflects the original date of manufacture nor does have to match with the date of manufacture.

Year: Refers to the year the test was initially done.

Triangle or arrowhead: Is the assigned stamp of the third party inspector used to test the container as mandated by the Department of Transportation.

WK: Walter Kidde Aerospace.

The **K** and the **X** are for in-house quality requirements. This marking will be stamped specifically on one of the lugs.

The markings for the re-test, must also follow the Department of Transportation federal regulation part 173.208. The mandatory marking design on a lug indicates the assigned D.O.T. identification number of a specific repair facility.

Month **C1** **32** Year

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